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ABSTRACT

The past 20 years of research into the efficacy of advance organizers has resulted in little empirical support for their use. A primary reason for this lack of strong support is the absence of true objective descriptions and definitions of the organizers used and the concomitant poor control over their derivation and construction. This deficiency has become particularly serious in the past decade since the popularization and availablility of systems designed to objectify the description of verbal information. The lack of substantively and statistically significant results is not surprising in view of these problems with the past research. Future work on the pedagogical effects of prereading organizers must utilize such available technology in theconstruction and description of both the text(s) used and the organizers. Due to the number of variables that need to be investigated or controlled in such work (including retention interval, subject area, student ability, student grade level, organizer type, and passage organization), it may be more practical to concentrate research efforts on more direct tests of the basic theory than on one of its pedagogical implications. (Author)

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Improving Advance Organizer Research: Persistent Problems and Future Directions

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Improving Advance Organizer Research: Persistent Problems and Future Directions

After 20 years of research on advance organizers there is surprisingly little unequivocal evidence regarding their efficacy and optimal use. The intent of this paper is to discuss two aspects of this research which are quite likely responsible for these anomalous findings: lack of scientifically objective advance organizer construction and definition, and the comparable lack of objective and ecologically valid descriptions of learning outcomes. No attempt is made to completely review advance organizer research since others have recently done so (Barnes & Clawson, 1975; Lawton & Wanska, 1977; Luiten, Ames & Ackerson, 1980; Mayer, 1971). Instead, the past work will be discussed briefly as it pertains to the two above points, the need for more objective instrumentation will be described, and implications for future research will be considered.

Advance organizers are introductory passages which are intended to facilitate the learning of targeted material. Their origin and use is based on Ausubel's subsumption theory which holds that "cognitive structure is hierarchically organized in terms of highly inclusive concepts under which are subsumed less inclusive subconcepts and informational data" (Ausubel, 1960, p. 267). This model is generally consistent with recent schema theory as described by Norman and Rumelhart (1975) among others, and research investigating the differential recall of prose material at differing hierarchical levels (Kintsch & Keenan, 1973; Meyer, 1975a, 1975b). New information is learned and retained to the extent that it can be related to existing cognitive structure. Content which is unfamiliar or organized in an unfamiliar fashion will be poorly

learned unless the individual is provided with or develops concepts or organizing principles which facilitate acquisition. Advance organizers are a logical extension of this theoretical paradigm. It is the function of advance organizers to encourage the development of or provide such an ideational or organizational framework. As Lawton and Wanska (1977) point out, advancer organizers do not bridge a gap between cognitive structure and new information; instead, they (hopefully) instigate their own cognitive structure to which the new information may be related. However, there still must exist some linking commonalities between previously acquired knowledge and the new cognitive structure. Since much school learning involves new material and/or the restructuring of existing information, advance organizers are potentially of substantial pedagogical value. Ausubel states that,

> advance organizers probably facilitate the incorporability and longevity of meaningful verbal material in two different ways. First, they explicitely draw upon and mobilize whatever relevant subsuming concepts are already established in the learner's cognitive structure and make them part of the subsuming entity. Thus, not only is the new material rendered more familiar and meaningful, but the most relevant ideational antecedents are also selected and utilized in integrated fashion. Second, advance organizers at an appropriate level of inclusiveness provide optimal anchorage. This promotes both initial incorporation and later resistance to obliterative subsumption. (1960, p. 270)

Thus, advance organizers are direct pedagogical products of a specific

scientific paradigm. Empirical failure of advance organizers to facilitate learning within the confines of this theoretical framework or paradigm does not necessarily discredit the paradigm (Ausubel, 1980), but it may instigate reformulation or additional specificity in order to explain such results without jeopardizing the basic model.

Advance Organizer Research

Recent reviews of advance organizer research (Luiten et al., 1980; Mayer, 1979) have concluded that advance organizers have a positive but small effect on learning and retention. The results are far from conclusive, however, with a number of studies finding no positive effects. The review by Luiten et al. (1980) contains perhaps the most interesting summary of past research. Using meta-analysis techniques they concluded that, overall, "The average advance organizer study shows a small, but facilitative effect on learning and retention" (p. 217). Of particular interest were the findings that the results varied across variables such as retention interval, presentation mode, grade level, subject area, and student ability in a manner not always consistent with theoretically based predictions. For example, older and more able students seemed to benefit from the use of organizers more than less able and younger students, and aurally presented organizers were more effective than written organizers.

All of the reviews cited above included recommendations for future research (Barnes & Clawson, 1975; Lawton & Wanska, 1977; Luiten et al., 1980; Mayer, 1979). The need for objectively defined and constructed advance organizers was consistently stressed in these papers, and more objective methods for qualifying and quantifying resultant learning (including the need for measures other than typical comprehension questions,

such as free recall assessment - both of which, however, need to be objectified) was also recommended.

Though graphic pre-organizers obviously differ from advance organizers, their theoretical origin and pedogogic purpose is similar. The structured overview, for instance,

> assumes the properties of Ausubel's advance organizers. It attempts to relate new content information to relevant subsuming concepts that have previously been learned. At the same time, pupils are given cues as to how the structure of the new unit relates to the structure of the course as a whole. (Barron, 1969, p. 33)

It is not surprising, then, that a recent meta-analysis of graphic organizer research (Moore & Readence, 1980) found only a general small positive effect with their use. The problems with and recommendations for graphic organizer research directly parallels that for advance organizer studies, and includes the need for more objective construction and definition of the organizer, and more thorough and objective assessment of learning outcomes.

The criticisms of past organizer research and the recommendations for future work are not aimed at Ausubel's learning theory (cf. Anderson, Spiro & Anderson, 1978). As Lawton and Wanska (1977) state, "Ausubel's theory is inherently logical. Superordinate concepts always subsume related subordinate concepts" (p. 239). The criticism is instead that several aspects of the research involving this paradigm were not and have not been adequately described according to scientific principles in such a way as to permit meaningful conclusions to be drawn.

The Principle of Operational Definition

One "rule of science," long accepted as a requirement for meaningful scientific investigations, which current and past organizer research has not met is,

> THE PRINCIPLE OF OPERATIONAL DEFINITION
> All terms in a descriptive statement must be carefully defined in terms of the operations involved in manipulating or observing their referents. (B. F. Anderson, 1971, p. 25)

Without such operational definitions the scientific activity not only loses its ability to be replicated, but, since the variables are incompletely specified, any conclusions are unwarranted and the project is rendered meaningless.

Organizer research has, of course, assumed an adequate operational definition based upon Ausubel's definitions (Ausubel, 1960, 1968; Ausubel & Fitzgerald, 1961, 1962). Despite his arguments to the contrary. (Ausubel, 1978), Ausubel's definitions of advance organizers are logical rather than operational. They explain conceptually what advance organizers are but do not specify precisely how they are to be constructed (or how they were constructed). The most frequent recurring descriptive statement used by Ausubel appeared in his first advance organizer study (Ausubel, 1960), and with slight variation in every related work thereafter: "The experimental introductory passage [advance organizer] contained background material for the learning passage which was presented at a much higher level of abstraction, generality, and inclusiveness than the latter passage itself" (p. 268). Examination of his later work (Ausubel, 1968,

1978; Ausubel & Fitzgerald, 1961, 1962) yields little more in the way of substantive operational specificity.

Though Ausubel's definition of advance organizers may not have been satisfactorily operational, his responsibility is only limited to his own work. It is by no means clear that the many investigators who conducted related work after Ausubel's original paper followed his logical definitions and guidelines. Likewise, there has been little apparent effort to further operationalize the construction of organizers.

Part of the reason for the lack of operational descriptions of organizers is undoubtedly the lack of appropriate tools or instrumentation with which to describe and characterize prose. Recognition of this deficiency spurred a number of researchers investigating other paradigms involving prose learning to develop discourse analysis techniques (e.g., Kintsch, 1974; Meyer, 1975a, 1975b). These tools enabled researchers to operationally define in concrete terms the nature of the variables being investigated and related aspects of prose. Their successful efforts have created, and continue to create, a revolution in verbal learning research. The results to date have not only vastly increased our knowledge of human information processing but also expanded and redefined related scientific paradigms. Increasing sophistication in the descriptions of verbal information has also caused the recognition of limitations of past research.

Text Analysis

One area surely susceptible to such a retrospective view is advance organizer work. Advance organizers were not operationally defined because they, and the passages from which they were derived, were not, and until about five years ago could not, be objectively described. The

discourse analysis methodology developed by Frederiksen (1975), Kintsch (1974, Kintsch & van Dijk, 1978), Meyer (1975a, 1975b), and Rumelhart (1975) can and must be applied to the advance organizer paradigm. As often occurs in science with a revolution in instrumentation (Kuhn, 1970), much of the past research will essentially have to be redone; the existing advance organizer paradigm may have to be modified; the analysis techniques themselves may be extended or modified and new technology developed. To use an example from another field of science, this is the sort of revolution which probably took place after the telescope began to be used for astronomy, where some theories based on a cruder instrumental observation were modified, some discarded, and some retained. Such change takes time (Kuhn, 1970), is difficult, and is resisted (cf. Anderson et al., 1978; Ausubel, 1980). Nevertheless, such change is a necessary and eventual result of proper science.

Though the discourse analysis systems developed in the past decade can and must be applied to advance organizer and graphic organizer research, such application will not necessarily be easy. Each system was developed for, or as a result of, a particular paradigm. Generalizing their use will quite likely require modifications. However, a system like that developed by Kintsch and van Dijk (Kintsch & van Dijk, 1978; van Dijk, 1977) which describes both the micro- and macro-level information, or Meyers' (1975a, 1975b) system which explicates logical relationships in discourse are very close to what is needed to objectify Ausubel's, "higher level of abstraction, generality, and inclusiveness" (Ausubel & Fitzgerald, 1962, p. 245). Kintsch and van Dijk's work (Kintsch & van Dijk, 1978; van Dijk, 1977), for instance, includes rules for the

development of a macro-level representation of a passage based upon the micro-structure. The resultant macro-structure, like the micro-structure, is "described in terms of propositions and proposition sequences" (Kintsch & van Dijk, 1978, p. 366). It describes the micro-structure in a more general, abstract, and global manner. Thus, it seems quite possible that such a macro-structure, arranged as connected discourse rather than a sequence of propositions, would qualify under Ausubel's logical guidelines as an advance organizer. The micro-structure and the macro-operators or macro-deriving rules would permit full operational definition and construction. It is thus possible today to objectively describe the content and organization of a passage or advance organizer. This would satisfy the requirement of the principles of operational definition (B.F. Anderson, 1971).

Free Recall Measures

Currently used discourse analysis systems, because they permit objective descriptions of passages, also facilitate a new thoroughness in the description of free recall as a learning outcome. One consistent recommendation for advance organizer research has been the utilization and analysis of free recall as a learning measure. This recommendation was based on the inherently limited nature of recognition questions as indicators of learning and retention, and on the lack of objective definitions of questions and their construction. Recall protocols could, for instance, be analyzed into a set of micro- and macro- propositions as defined by Kintsch and van Dijk (Kintsch & van Dijk, 1978; van Dijk, 1977) which could then be characterized by a comparison to a similar analysis of the original passage and/or the organizer. Lucas and McConkie

(1980) have also begun to apply discourse analysis to the problem of objectifying the construction of comprehension questions. This lead needs to be continued and must not be ignored in future research employing comprehension questions.

The effects of such application will be multi-faceted. It is extremely likely that the advance organizer and graphic organizer paradigms will be modified eventually. Perhaps, with the increased ability to characterize discourse, such organizers will be abandoned in favor of manipulation of passage structure itself. Undoubtedly the relevant learning paradigms will become more clear and increasingly specific. Along with this, the analysis techniques themselves will evolve so that they are more generally applicable and complete.

Such changes will make research more time-consuming and will require a higher, or at least different, level of expertise. Much as a molecular biologist must spend many years learning to use and interpret the results from mass spectrometers and electron microscopes, so will scientists need to spend such time with discourse analysis systems. Once proficiency in use and interpretation is attained, application of the methodologies to research questions will certainly require a more significant time commitment than previously required by the standards of prose learning research.

To continue advance organizer and graphic organizer research without improving objectivity of the variables (both dependent and independent) is at best pseudo-science. Whether currently available discourse analysis techniques or some other methodology is used, both the organizer construction and the learner products must be better defined.

Organizer research can be instigated from two bases. First, it can be undertaken in order to refine, clarify, and extend the related theoretical paradigm. Such work can and should be undertaken with the most precise and thorough technology available, as discussed above. Because this research has as its purpose the development of our understanding of verbal processing, however, it is not restricted to investigating the effects of organizers. Instead, the primary focus is explication of the interaction between organizational and content variables with subject characteristics, including ability age, topic familiarity, and resultant learning and retention. Thus, work on organizers could logically be abandoned without abandoning the basic paradigm.

Future Directions in Applied Advance Organizer Research

Most research over the past 20 years centered on whether or not and under what conditions organizers can facilitate learning and retention. Though related, of course, to the theoretically oriented work, the motivation, focus, and conclusions of this research have been predominantly pedagogical. The results have less than conclusively indicated a small facilitative effect, as discussed above. Future pedagogical research must not only utilize the same technology as the theoretically oriented work, it must also account for a number of additional variables. The list of variables is derived from those already indicated as having an effect on learning and retention from organizers, and includes the age, ability, and subject familiarity of the students, the type and derivation of the organizer, the structural and topical characteristics of the target passage, and the length of the treatment and retention intervals. Obviously, controlling and manipulating this large set of

variables will require significantly more extensive research projects than most undertaken to date, with a concommitant increase in time and resources.

Finally, it is by no means clear that research efforts designed to test the efficacy of a preconceived researcher--or teacher--constructed introduction to a passage are productive or even necessarily consistent with Ausubel's subsumption theory. Subsumption theory may be primarily relevant to an internal, reader-based ingredient of learning that is highly individualistic and not amenable to any single advance organizer construct. Additionally, if publishers, writers, and teachers will not or cannot utilize advance organizers due to the time and expertise needed for construction, then the research may be wasted. It may be more profitable to directly investigate the pedagogical implications of the more theoretically derived work on passage organization and structure. Writers and publishers may, after all, be more willing to modify their work than to supplement it.

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